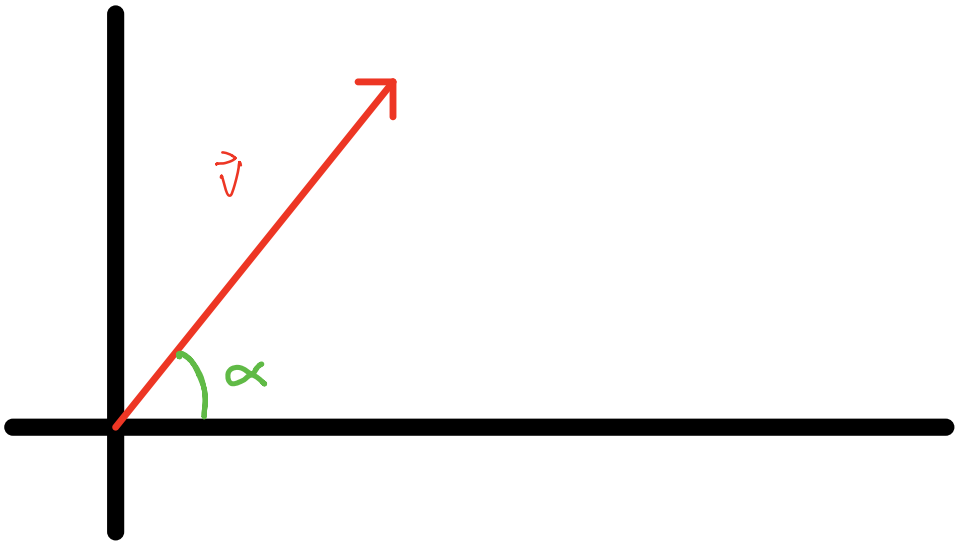
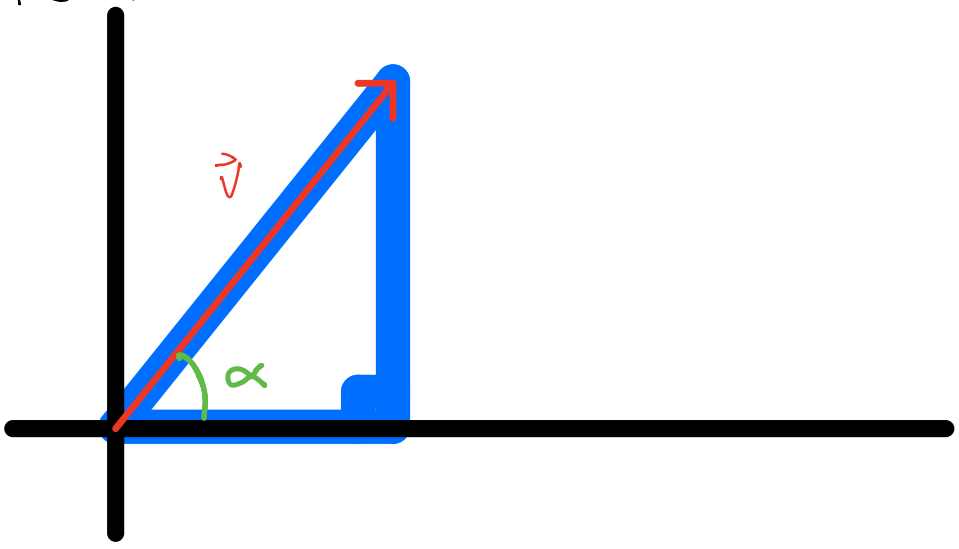
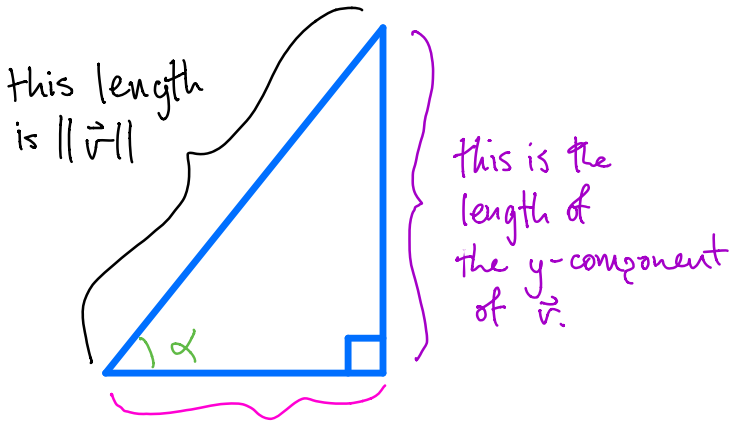
If we know the magnitude of a vector, $\vec{v}$, and its angle of elevation relative to an axis, α, then we can express $\vec{v}$ as the sum of its components. Here is the picture we have in mind:



Now, we want to figure out the components of $\vec{v}$, in terms of $\|\vec{v}\|$ and α. So, we look at the triangle formed by $\vec{v}$ and the axis:



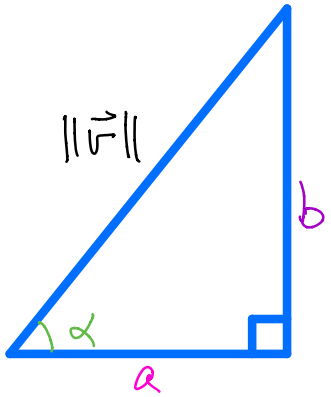


So if we write

$\vec{v} = \langle a, b \rangle$, or

$\vec{v} = a\hat{i} + b\hat{j}$

we have ⟶



and from this we can use the fact that, in a right triangle,

$\sin(\alpha) = \frac{b}{\|\vec{v}\|}$ $\quad b = \|\vec{v}\| \sin(\alpha)$

and $\cos(\alpha) = \frac{a}{\|\vec{v}\|}$ to get $\quad a = \|\vec{v}\| \cos(\alpha)$

So, we have that $\vec{v} = a\hat{i} + b\hat{j}$

$= \|\vec{v}\| \cos(\alpha)\hat{i} + \|\vec{v}\| \sin(\alpha)\hat{j}$

or

$\vec{v} = \langle \|\vec{v}\| \cos(\alpha), \|\vec{v}\| \sin(\alpha) \rangle$.